

SHORT COMMUNICATION

***Livistona leichhardtii* is the correct name for *Livistona lorophylla* (Arecaceae)**

Livistona R.Br. is the most speciose genus of palms in Australia, with 18 indigenous species (Dowe & Jones 2011). Although the taxonomy, nomenclature and typification of *Livistona* species have been relatively stabilised by recent treatments (Rodd 1998; Dowe 2009, 2010) a number of issues with regards to status and nomenclature have remained unresolved. Examination of a number of names in synonymy has shown that the identity and status of the name *L. leichhardtii* F. Muell. has been misapplied and is the correct name for *L. lorophylla* Becc., a species occurring in Western Australia and the Northern Territory.

Ferdinand Mueller, the Victorian Government Botanist, was appointed to the North Australian Expedition of 1855–56, commanded by A.C. Gregory (Gregory 1858; Mueller 1858a; Gregory & Gregory 1884). The expedition sailed from Brisbane on 11 August 1855, landed briefly on islands off the east Queensland coast before proceeding to Port Essington, and then to Victoria River where the party landed on 16 September 1855. During the following eight months, the expedition traversed Macadam Range and then thoroughly explored the Victoria River/Sturt Creek area to as far inland as Lake Gregory [20° 12' S, 127° 27' E] before proceeding eastward to the Gulf of Carpentaria on 21 June 1856. After travelling through Queensland (then still New South Wales) following mainly the Nicholson, Gilbert, Burdekin, Suttor, Belyando, Mackenzie and Dawson Rivers, the expedition terminated in Brisbane on 13 December 1856.

There are three known specimens of *Livistona* that were collected by Mueller during the expedition, two from Victoria River area labelled by him as '*Livistona* fruit ovate Arnhem's Land, Mcadam's Range 1855' (MEL 1059368) and '*Livistona* ? *leichhardtii* F. Muell. Arnhem's Land Dr. Ferd. Mueller' (MEL 1059501), and one from the Gulf of Carpentaria labelled as '*Livistona* Albert River Ferd. Mueller' (K 000209824). This latter taxon was subsequently named as *L. rigida* Becc., and is not otherwise involved in this investigation. Mueller used the term 'Arnhem's Land' to denote the entire northern portion of northern central Australia (then New South Wales) and not the east portion of the 'Top End' as used today. Mueller's use of the name Macadam Range also needs to be considered. The concise delineation of Macadam Range on modern maps is restricted to the north of Fitzmaurice River, although Mueller appears to have also used the name for the elevated landforms between Fitzmaurice River and Victoria River.

In his botanical report for the expedition, Mueller (1858b) wrote that '*Livistona inermis* and an allied species supplied us occasionally with palm cabbage' and that the 'sandstone tableland forms in its endless extent a landscape equally arid and cheerless ... *Livistona inermis* gracing now and then its declivities'. In the 'Systematic Listing' appended to his report, Mueller noted that *Livistona* was represented by two species ['Palmae ... *Livistona* ... 2'], but did not provide any specific names, designations or descriptions.

Mueller's interpretation of *L. leichhardtii*

At the time of the North Australian Expedition, the taxonomic understanding of Australian species of *Livistona* was rudimentary, with only three species thus far described: *L. humilis* R.Br., *L. inermis* R.Br. and *L. australis* (R.Br.) Mart. (Brown 1810; Martius 1838). *Livistona leichhardtii* was subsequently described by Mueller (1874a, 1874b) thus providing a fourth species for the genus in Australia.

Historically there have been different appraisals concerning the identities of *L. humilis*, *L. inermis* and *L. leichhardtii*. Brown (1810) described *L. inermis* [*frondis laciniis filis interjectis; stipitibus inermibus, caudice 14–30–pedali*] and *L. humilis* [*frondis laciniis filis interjectis; stipitibus spinosis, caudice 4–6–pedali*] from islands in the Gulf of Carpentaria, and their descriptions, because of their brevity, were open to interpretation. Martius (1838), with additional specimens at hand, gave detailed descriptions of both of Brown's species and clearly circumscribed their characteristics and differences. The first formal proposal to place *L. humilis* as a synonym of *L. leichhardtii* was provided by Wendland and Drude (1875) in *Palmae Australasiae*, but they maintained the name *L. inermis* as a distinct species (though not directly referable to Brown's *L. inermis* but to what was later to be described as *L. decora* (W.Bull) Dowe). Bentham (1878), in his treatment of palms in *Flora Australiensis*, took a different approach and placed *L. leichhardtii* as a synonym of *L. humilis*, but also maintained *L. inermis* as distinct (but tendered that it 'may prove to be a variety only of *L. humilis*'). Mueller (1878: 55), in a summary of Australian palms, wrote '*Livistona Leichhardtii* forsans includit *L. inermem* et *L. humilem*; neutrius Brownianae nomen toti speciei aptum' [translates as: '*Livistona leichhardtii* may include *L. inermis* and *L. humilis*; neither of Brown's names fit well to this species'], thus questioning what name should apply but otherwise not making any formal changes. However, in his *Systematic Census of Australian Plants*, Mueller (1882) listed both *L. inermis* and *L. humilis*, but did not include *L. leichhardtii*. In contrast, in his *Select Extra-Tropical Plants*, Mueller (1885: 202) noted for *L. leichhardtii* that 'Under this name might be combined *L. inermis* and *L. humilis* (R. Brown), neither name applying well to this finally tall palm with thorny leaf-stalks'. Subsequently, Mueller (1889) was to maintain this position in the *Second Census of Australian Plants*, excluding both *L. inermis* and *L. humilis* but listing *L. leichhardtii* in their place. To summarise his assessment, Mueller (1892: 652) wrote: 'When in 1856 I saw a tall *Livistona* far in the interior of Arnhem's-land, evidently the same which Leichhardt noticed there in 1845, I gave it the name of that lamented geographer, because it agreed not with the short diagnosis given by R. Brown and by Kunth for the tropic Austral *Livistonas*, and when I subsequently became almost convinced, so far as I here could judge, that *L. humilis* is a youthful *L. inermis*, I kept up the name *L. leichhardtii* for the united species, their original names having become inapplicable now'. Drude (1893) followed Mueller's interpretation placing both *L. inermis* and *L. humilis* as synonyms of *L. leichhardtii*. Beccari (1921) in his detailed synopsis of *Livistona*, followed Bentham's previous proposal and placed *L. leichhardtii* as a synonym of *L. humilis*, retained *L. inermis* as distinct and recognised *L. lorophylla*. The most recent treatments of *Livistona* also supported this latter arrangement, somewhat uncritically, and the name *L. leichhardtii* had been seemingly 'lost' to synonymy (Rodd 1998; Dowe & Jones 2011).

With his description of *L. leichhardtii*, Mueller indeed established a distinct new taxon unrelated to either *L. inermis* or *L. humilis*. Mueller's protologue description for *L. leichhardtii* most closely resembles *L. lorophylla* (Beccari 1921), the primary characteristics for both being '*Praeaalta, petiolo spinuloso*' (very tall with spiny petioles) and '*semen ovatum*' (ovate seeds). Morphologically this distinguishes *L. leichhardtii* from *L. inermis*, which has smooth or sub-spiny petioles, and from *L. humilis*, which is a short-statured species.

Status of *Livistona leichhardtii*

To determine the connection between Mueller's specimens and collection locations, a detailed examination of the routes travelled by Mueller during the North Australian Expedition of 1855–56 indicates that he did not visit or travel near any presently known populations of either *L. inermis* or *L. humilis* but that he travelled through Macadam Range where *L. lorophylla* has been reported as occurring, and through the Victoria River area where what he called *L. inermis* was later described

as *L. victoriae* Rodd. It appears that Mueller's use of the name *L. inermis* for *L. victoriae* was possibly in relation to the similarly unarmed petioles of that species, and that his 'allied species' of *Livistona* was what he subsequently described as *L. leichhardtii*.

With regard to the two specimens of *Livistona* that Mueller collected in the Victoria River area, MEL 1059368 and MEL 1059501, both have been identified as *L. humilis* (Rodd 1998; Dowe 2009; Dowe & Jones 2011), determinations that are, given the above information, demonstrably incorrect. Rodd (1998) who designated MEL 1059368 as the lectotype of the name *L. leichhardtii* considered this name to be a taxonomic synonym of *L. humilis*, however there is no evidence that *L. humilis* occurs at Macadam Range or in the Victoria River area, the rugged sandstone habitat not being suitable, and with its closest known occurrence about 50 km to the north-east of Macadam Range.

Unfortunately, both of Mueller's *Livistona* 'Arnhem's Land' specimens are deficient. Neither has leaf material, although both have inflorescence portions and fruit, the latter of which are critical in identifying some north Australian *Livistona* species. The Australian *Livistona* species with ovoid/obovoid fruits include *L. eastonii* C.A. Gardner, *L. humilis*, *L. inermis* and *L. lorophylla*. Other fruit shapes in *Livistona* include globose and ellipsoid. MEL 1059368 has a single ovoid fruit whilst MEL 1059501 has four globose fruit. Mueller described the fruit as 'ovate' in the protologue, which matches with MEL 1059368. It must be noted that Mueller's labelling of MEL 1059501 as '*Livistona* ? *leichhardtii*' is misleading, as the fruit in that specimen are globose and thus being a collection of *L. victoriae*, the only globose-fruited species in the area.

It is understandable therefore that MEL 1059368 could be determined as *L. humilis* on the basis of fruit shape alone, although the collection location discounts that species. *Livistona inermis* can also be discounted as its distribution does not extend south of about Katherine Gorge some 260 km to the east-north-east of Macadam Range. Similarly, *L. eastonii* can be discounted as it occurs some 360 km to the west in the Mitchell Plateau, Western Australia. In regards to MEL 1059501, the specimen with globose fruit, it best matches *L. victoriae*, which apparently Mueller informally interpreted as *L. inermis* (Mueller 1858b).

It is clear that *L. leichhardtii* is distinct from *L. inermis* and *L. humilis* despite Mueller's uncertainty regarding these earlier names. Mueller had a reasonably clear understanding of what constituted his *L. leichhardtii*, as the protologue provided a detailed description. This is supported by Mueller's identification of other specimens. For example, those collected by Johnson in 1885 from 'near Cambridge Gulf' that were later involved in the typification of *L. lorophylla* (Beccari 1921) were originally identified and labelled by Mueller as *L. leichhardtii*. Therefore, with reference to the above explanation and reasoning, *L. leichhardtii* is here proposed as the correct name for *L. lorophylla*, and a revised taxonomy is presented.

Taxonomy

Livistona leichhardtii F.Muell., *Fragm.* 8(68): 221 (1874).

Type citation: 'In *Arnhemia* et *regionibus* vicinis, ubi jam *Leichhardtio* notata.' *Type specimen*: Macadam Range, Northern Territory, Oct. 1855, F. Mueller s.n. (*lectotype*, *vide* A.N. Rodd, *Telopea* 8: 109 (1998): MEL 1059368!).

Note. The specimen MEL 1059501, labelled by Mueller as '*Livistona* ? *leichhardtii* F.Muell. Arnhem's Land Dr. Ferd. Mueller', is here identified as *L. victoriae*, and therefore excluded from the typification

of *L. leichhardtii*. Rodd (1998) appears to have misinterpreted Mueller's two specimens from 'Arnhem's Land', taking on Mueller's incorrectly labelled '*Livistona ? leichhardtii*', i.e. MEL 1059501, as representing *L. leichhardtii*, but otherwise correctly identifying the specimen labelled '*Livistona ...* Oct. 1855', i.e. MEL1059368, as the type for the name.

Livistona leichhardtii F.Muell., *Fragm.* 5(33): 49, 234 (1865), *nom. nud.*

Livistona lorophylla Becc., *Webbia* 5: 18 (1921) as *loriphylla*. *Type specimens*: Cambridge Gulf, Western Australia, 1885, *Johnston s.n.* (*holo*: FI!; *iso*: MEL 0067691!, MEL 0067692!, NSW 693019).

Livistona sp. 'A', A.J.G. Wilson, *Fl. Kimberley Region*: 1250 (1992).

Livistona kimberleyana Rodd, *Telopea* 8: 121, Figures 4g, 17d (1998). *Type specimens*: Durack Range, Mt King, Western Australia, 24 Oct. 1974, *A.N. Rodd* 2866 (*holo*: NSW 501606! (sheet 1 of 3), – 501607! (sheet 2 of 3), – 501608! (sheet 3 of 3); *iso*: CANB 549137!, K 000209069!, PERTH 06125972!, PERTH 06125964!).

Solitary-stemmed *palm*, to 15 m tall, 8–20 cm dbh; leafscars raised; internodes narrow, grey; stem base with persistent petiole remnants. *Leaves* 25–40 held in a globose crown; petiole arching, 70–200 cm long, 1–1.7 cm wide, flat on the adaxial surface, margins with small to moderate, scattered, single-curved black spines; leafbase fibres moderately prominent, coarse, persistent; lamina regularly segmented, circular in outline, 60–100 cm long, coriaceous, glossy mid-green to pruinose-grey on both surfaces; segments 34–50, pendulous to flaccid, segments free for 85–98% of their length, depth of apical cleft 55–78% of the length of the free segment; apical lobes semi-pendulous, acuminate to filiform. *Inflorescences* 20–160 cm long; partial inflorescences 4–8, branched to 3 orders; prophyll 20–22 cm long, 3–4 cm wide, glabrous, apices papery, lacerate; peduncular bract single, infrequently lacking; rachis bracts sparsely tomentose; terminal partial inflorescence bifurcating at the base, ebracteate; rachillae 10–35 mm long, glabrous. *Flowers* solitary or in clusters of 2–4, broadly funnel shaped, 1.2–3 mm long, to *c.* 1 mm wide in bud; sepals triangular to broadly ovate, 1.2–3 mm long, acute to cuspidate, apex curved inward, white-cream; stamens *c.* 1.6 mm long; anthers *c.* 0.5 mm long, subglobose to ovoid, cream. *Fruit* ovoid-obovoid to infrequently pyriform, 8–14 mm long, 6–9 mm diam.; epicarp dull black-pruinose with scattered lenticellular pores; mesocarp thin, fibrous; endocarp thin, crustaceous. *Seed* ellipsoid, 7–9 mm long, 4–7 mm wide; eophyll long and narrow, 3-ribbed.

Diagnostic features. *Livistona leichhardtii* may be distinguished by the moderately tall stem; deeply divided leaves with pendulous segment apices; inflorescences with up to eight partial inflorescences; a single peduncular bract (infrequently lacking); and ovoid-obovoid, dull black-pruinose fruit.

Selected specimens. WESTERN AUSTRALIA: Kalumburu Mission, 1 Aug. 1973, *L. Brigden s.n.* (DNA); King Leopold Ra., Lenard River Gorge, *c.* 130 km ENE of Derby, 22 July 1974, *G.W. Carr* 3978 & *Beaaglehole* 47756 (PERTH); King Leopold Ra., 26 km NE of Inglis Gap, 4 May 1996, *J.L. Dowe* 356–358 (BRI); El Questro Station, Cambridge Gulf, 100 m E of Pentecost River, 5 May 1996, *J.L. Dowe* 362 (BRI, FTG); Mt Broome, May 1905, *W.V. Fitzgerald s.n.* (PERTH); Mt Leake, July 1905, *W.V. Fitzgerald s.n.* (PERTH); Napier Bay, Lower King Edward River, 22 Aug. 1921, *C.A. Gardner* 1044 (PERTH); King Leopold Ra., 2 km W of March Fly Glen towards Derby on Gibb River road near Mt Bell, 20 Aug. 1983, *B. Hastings* 1 (PERTH); West Kimberley, 6.5 km NW of Kimbolton Homestead on mid Stewart River, 21 Aug. 1983, *B. Hastings* B2 (PERTH); King Leopold Ra., Sale River 29.2 km WSW of Mt French, 25 June 1987, *G.J. Keighery & J.J. Alford* 1402 (PERTH); Prince Regent River Reserve, Marigui Promontory, 27 Aug. 1974, *K.F. Kenneally* 2162

(PERTH); West Kimberley, gorge of unnamed creek running W of Sale River 30 km ESE of mountain, 15 May 1984, *K.F. Kenneally* 9652 (PERTH); Kimberley, 54.7 km SW of turnoff to Beverley Springs Homestead, Gibb River Road, 2 June 1986, *K.F. Kenneally* 9793 A (PERTH); West Kimberley, upper reaches of Roe River, 27 May 1987, *K.F. Kenneally* 9991 (PERTH); Chamberlain River Gorge, 7 km W of El Questro Station Homestead, 30 June 1989, *K.F. Kenneally* 10978 (PERTH); 19 km W of Cape Rulhiers, 4 June 1987, *K.F. Kenneally & B.P.M. Hyland* 10145 (PERTH); Sale River, 15.5 W of Mt Lochee, 19 June 1987, *K.F. Kenneally & B.P.M. Hyland* 10464 (PERTH); south base of Mt King, Durack Ra., *A.N. Rodd* 2868 (QRS); 3 km ESE of Kalumburu Mission, 25 Oct. 1974, *A. Rodd* 2871 (K); Mt Hart Station, 15 July 1997, *L. Wallis* LW(97A/82 (PERTH); south slopes of Sir Graham Moore Island facing the Geranium Islands, 3 Apr. 1991, *T. Willing* 293 (PERTH); Sir Graham Moore Island, 30 June 1973, *P.G. Wilson* 11222 (PERTH); Brunswick Bay, Uwins Island, 8 July 1973, *P.G. Wilson* 11450 (PERTH). NORTHERN TERRITORY: Trudies Falls, Spirit Hill Cons. area, 4 km NW of Nancys Gorge, 18 Aug. 1996, *I. Cowie* 7119, 7121 (DNA); Victoria River area, 9 Mar. 1989, *C. Dunlop* 8203 (DNA); Milligans Lagoon, Spirit Hill Station, Milligans Paddock, 26 June 1994, *D. Fett s.n.* (DNA); Keep River NP, c. 60 km NE of Ranger Station, 12 May 2011, *D. Lewis* 1705 (DNA); Trudies Falls, Spirit Hills Escarpment, 18 Aug. 1996, *C. Michell* 266 (DNA); Goobaieri Bay, Bradshaw Station, near Fire Plot 3, 18 Feb. 1999, *C. Michell* 2099 & *C. Yates* (DNA); Spirit Hills Station, Kneebone area, 17 Sep. 1999, *D. Napier* 52 (DNA); Goobaieri Bay, Bradshaw Field Training Area, c. 90 km NW Timber Creek, 2 Apr. 2007, *B. Stuckey* 49 (DNA).

Distribution. Western Australia and Northern Territory. In the Northern Kimberley, Central Kimberley, Dampierland and Victoria Bonaparte bioregions, from Sir Graham Moore Island to Sale River, Cambridge Gulf, Macadam Range and Victoria River, and inland to the King Leopold and Durack Ranges.

Conservation status. *Livistona leichhardtii* is not considered under threat.

Etymology. Named for Friedrich Wilhelm Ludwig Leichhardt (1813–c. 1848), German-born explorer and naturalist, who vanished during an attempt in 1848 to traverse Australia from east to west. Ferdinand Mueller developed a life-long interest in Leichhardt, and promoted and organised several searches for the lost explorer and his party, but they were never found (Dowe & Maroske 2016).

Key to ovoid/obovoid-fruited species of *Livistona* in Australia

1. Petiole margins lacking spines, occasionally with small prickles toward the base; peduncular bracts lacking **L. inermis**
- 1: Petiole margins with spines, longest toward the petiole base; peduncular bracts present **2**
2. Plants sexually dimorphic; inflorescences on male plants with 4–7 partial inflorescences and the female plants with a single terminal partial inflorescence; palms to 7 m tall **L. humilis**
- 2: Plants not sexually dimorphic; palms to 21 m tall **3**
3. Leaves 9–20 in mature palm; leaf segments mostly rigid, free for c. 70% of the length of the leaf; leaf segment apical cleft c. 55% of the length of the segment; inflorescences branched to 3 orders; fruit glossy purple-black; palm to 21 m tall **L. eastonii**
- 3: Leaves 25–40 in mature palm; leaf segments pendulous, free for c. 92% of the length of the leaf; leaf segment apical cleft c. 70% of the length of the segment; inflorescences branched to 4 orders; fruit dull pruinose-black; palm to 15 m tall **L. leichhardtii**

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